

What is claimed is:

1. A respirator that comprises:

(a) a face piece sized to fit at least over the nose and mouth 55
of a person;
(b) a cartridge receiving structure located on the face
piece, and
(c) a filter cartridge that has a housing into which a filter
element is contained, the filter cartridge capable of 60
being manually snapped into engagement with the
cartridge receiving structure to produce an audible
noise, the engagement being instantaneously obtain-
able by pressing the filter cartridge against the receiv-
ing structure without rotational [movement.] 65
movement, the filter cartridge further
being capable of being readily
separated from the cartridge receiving
structure by pulling manually thereon.

2. The respirator of claim 1 being a negative pressure
respirator.

3. The respirator of claim 1, wherein there is an interference fit between the filter cartridge and the cartridge receiving structure such that an essentially air-tight seal is provided.

5 4. The respirator of claim 1, wherein the filter cartridge has a flange that has a radially outward projecting surface, and the face piece has a skirt that has a radially inward projecting surface, the radially outward and radially inward projecting surfaces forming an essentially air-tight seal

10 between the cartridge and the face piece during engagement.

5 5. The respirator of claim 1, including a snap-fit engagement mechanism that comprises a male member and a female member, wherein during engagement of the filter cartridge to the cartridge receiving structure, the female member first expands and then compresses radially inward.

15 6. The respirator of claim 1, including a snap-fit engagement mechanism that comprises a male member and a female member, wherein during engagement of the filter cartridge to the cartridge receiving structure, the male member first compresses while the female member simultaneously first expands and then the male member expands radially outward while the female member simultaneously compresses radially inward.

7. The respirator of claim 1, wherein the filter cartridge

25 includes a cylindrical housing that contains a cylindrical filter element, the cylindrical filter element being offset axially from the cartridge receiving structure when the filter cartridge is in engagement with the cartridge receiving structure.

30 8. The respirator of claim 7, wherein the cartridge receiving structure encompasses an aperture having a circumference that is substantially less than the circumference of the cylindrical filter element.

9. The respirator of claim 1, wherein the filter cartridge

35 can be snapped into engagement with the face piece by the steps that consist essentially of pressing the filter cartridge against the face piece in a direction normal to the face piece.

10. The respirator of claim 9, wherein the filter cartridge can be removed from the face piece by the steps consisting

40 essentially of grasping the filter cartridge and pulling thereon axially in a direction normal to the face piece.

11. The respirator of claim 1, wherein the filter cartridge

mates with the cartridge receiving structure such that a force of 10 to

60 Newtons is required to remove the filter cartridge from

45 the cartridge receiving structure.

12. The respirator of claim 11, wherein 10 to 15 Newtons of force is required to remove the filter cartridge from the cartridge receiving structure.

13. The respirator of claim 1, including a snap-fit engagement mechanism that comprises a male member and a female member, wherein during engagement of the filter cartridge to the cartridge receiving structure the male member first compresses and then expands radially outward.

50 14. The respirator of claim 13, further including a second engagement mechanism that is located laterally from the snap-fit engagement mechanism.

55 15. The respirator of claim 13, wherein the snap fit engagement mechanism is offset laterally from the filter element and includes an outflow aperture having a circumference substantially smaller than a circumference of the filter element.

60 16. The respirator of claim 1, wherein the cartridge receiving structure is in the form of a projecting flange, and wherein the filter cartridge includes a skirt that engages the projecting flange.

65 17. The respirator of claim 16, wherein the skirt is made from a polymeric resin that has a flexural modulus of 2×10^8

to 30×10^8 pascals, and wherein the projecting flange is made from a more rigid polymeric material that has a flexural modulus of 6×10^8 pascals to 70×10^8 pascals.

18. The respirator of claim 16, wherein the projecting flange has a radially outward projecting surface that engages a radially inward projecting surface on the skirt.

19. The respirator of claim 18, wherein the skirt expands radially outward from a rest condition and the projecting flange is pressed radially inward when the filter cartridge is pressed towards the face piece. 10

20. The respirator of claim 19, wherein the skirt exerts pressure on the projecting flange during engagement to create an essentially airtight seal between the skirt and the flange.

21. A respirator that comprises:

a face piece sized to fit at least over the nose and mouth of a person;

a filter cartridge that includes a housing and a filter element, the filter element being contained within the housing; and

a snap-fit engagement mechanism that enables the filter cartridge to be instantaneously and audibly secured to the face piece, the snap-fit engagement mechanism including a male member and a female member, wherein during the snap-fit engagement of the filter cartridge to the face piece the male member initially compresses radially inward while the female member simultaneously initially expands radially outward followed by the male member expanding radially outward while the female member simultaneously compresses radially inward.

22. A filter cartridge useful for filtering contaminants that are inhaled through a respirator worn by a person and for permitting instantaneous attachment and removal from a cartridge receiving structure on a face piece of the respirator, the filter cartridge comprising a housing and a filter element, the filter element residing in the housing and the housing

including a means for allowing the filter cartridge to be manually and audibly snapped into engagement with a cartridge receiving structure by pressing the filter cartridge against a cartridge receiving structure on a face piece without using rotation [movement] movement

and for readily separating the filter cartridge from the cartridge receiving structure by pulling manually thereon.

23. A respirator that comprises:

a face piece sized to fit at least over the nose and mouth of a person;

a filter cartridge that includes a housing and a filter element, the filter element being contained within the housing; and

a snap-fit engagement mechanism that enables the filter cartridge to be instantaneously and audibly secured to the face piece, the snap-fit engagement mechanism including a male member and a female member, wherein during the snap-fit engagement of the filter cartridge to the face piece, the male member initially compresses radially inward while the female member remains essentially static followed by the male member expanding radially outward.

24. A respirator that comprises: A

a face piece sized to fit at least over the nose and mouth of a person;

a filter cartridge that includes a housing and a filter element, the filter element being contained within the housing; and

a snap-fit engagement mechanism that enables the filter cartridge to be instantaneously and audibly secured to the face piece, the snap-fit engagement mechanism including a male member and a female member, wherein during the snap-fit engagement of the filter cartridge to the face piece, the male member remains essentially static while the female member initially expands radially outward followed by compressing radially inward.

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25. A respirator that comprises:

263

- (a) a face piece sized to fit at least over the nose and mouth of a person;
- (b) a cartridge receiving structure located on the face piece;
- (c) a filter cartridge including a housing and a filter element contained in the housing; and
- (d) means for manually snapping the filter cartridge into instantaneous engagement with the cartridge receiving structure to produce an audible noise by pressing the filter cartridge against the receiving structure without rotational movement and for readily separating the filter cartridge from the cartridge structure by pulling manually thereon.

26. The respirator of claim 25, wherein the means for manually snapping includes a male member and a female member so configured wherein during the snap-fit engagement of the filter cartridge to the face piece the male member initially compresses radially inward while the female member simultaneously initially expands radially outward followed by the male member expanding radially outward while the female member simultaneously compresses radially inward.

27. The respirator of claim 25, wherein the means for manually snapping includes a male member and a female member so configured wherein during the snap-fit engagement of the filter cartridge to the face piece, the male member initially compresses radially inward while the female member remains essentially static followed by the male member expanding radially outward.

28. The respirator of claim 25, wherein the means for manually snapping includes a male member and a female member so configured wherein during the snap-fit engagement of the filter cartridge to the face piece, the male member remains essentially static while the female member initially expands radially outward followed by compressing radially inward.